

# Work Order ID 85402

June-07-12 10:34:54 AM

**\*85402\***

Page 1

Item ID: D350-748-201

Accept

**\*N900040100\***

Setup Start **\*NS1\***

Revision ID:

Stop **\*NS2\***

Item Name: Crosstube Installation, High Aft

Start Date: 07/06/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 21/06/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan: *MLJ*

Date: *12/06/07* Tooling:

Date:

Run Start **\*NR1\***

QC:

Date: SPC (Y/N):

Date:

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

Draw Nbr

Revision Nbr

D350-748-241

F

*MLJ 12/06/12*

100

0.00

**\*100\***

DOCUMENT CONTROL

DC

Memo

0.00

Document Control

Photocopy bluefile & type labels per PPPD350-748-201

CHG002

*1*

*12.06.25*

110

0.00

**\*110\***

BENDING MACHINE - CROSSTUBES

CNC Bend 2

Memo

0.00

CNC Alpha 160 Bender

Bend tube as per Dwg D350-748-241 using CNC bender program D350A and Folio FT

\*\*\*\*\*UNDER BEND .225" PER SIDE\*\*\*\*\*

*12-6-7*

120

QC15- Crosstube Dimensional Check

0.00

**\*120\***

QC

Memo

0.00

Quality Control

*12.06.25*

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June-07-12 10:34:54 AM

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Process Plan:

Date:

Tooling:

Date:

Run Start **\*NR1\***

QC:

Date:

SPC (Y/N):

Date:

Stop **\*NR2\***

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

125

0.00

**\*125\***

HandFXtube

0.00

Hand Finishing Crosstubes

Memo

\*\*\*Stress relief\*\*\*

Heat treat crosstube as per QSI010 43

Temp:

Start time:

Finish time:

127

QC5- Inspect part completeness to step on W/O

0.00

**\*127\***

QC

0.00

Quality Control

Memo

**POSITIVE RECALL**

EFFECTIVE 12/6/12 AUTH UP

RELEASED DATE

TURN DIMS

12/6/12

perch. issue P/O to metcar P/O: 17159

CH 12/06/25. ①

rec'd rec'd + inspect attached c/c

12/6/25 ①

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**\*85402\***

Page 3

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Required Date: 21/06/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_

Date: \_\_\_\_\_

Tooling: \_\_\_\_\_

Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_

Date: \_\_\_\_\_

SPC (Y/N): \_\_\_\_\_

Date: \_\_\_\_\_

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130	Crosstubes	0.00							
<b>*130*</b>									
Crosstubes	<b>Memo</b>	0.00							
Crosstubes	1-Drill Tube as per Dwg D350-748-241 Using DT8876 Drill Jigs, Set-up drill table as per QSI 010								
	2-Deburr								
	3-Engrave Part # and Batch # as per Dwg D350-748-241								
	4-Remove all marks from tube within limits of D350-748-241								
	5- Apply a light coat of LPS3 on the interior of tube Batch: _____								
140	QC6- Inspect dimensions to drawing	0.00							
<b>*140*</b>									
QC	<b>Memo</b>	0.00							
Quality Control									

**POSITIVE RECALL**

EFFECTIVE 12/6/9 AUTH JP

RELEASED JP DATE 12/6/24

*JP*

*Chapman*

# Work Order ID 85402

\*85402\*

Page 4

June-07-12 10:34:54 AM

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Cust Item ID:

Required Date: 21/06/2012 Req'd Qty: 1.00

\*1\*

Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run Start \*NR1\*

QC:

Date:

SPC (Y/N):

Date:

Stop \*NR2\*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

150 Outsource process-Cadplate per QSI017 4.1.9.1 0.00

\*150\*

Outsource3

Outsource process - Cad plate

Memo

Issue P/O:

17184

Stress relief at 375° for 5 hours  
Magnetic Particle Inspect per ASTM E1444  
Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2  
Embrittle relief at 375° for 8 hours, Chromate Treat  
Possibe Supplier: Southwest United Industries  
Ensure Certificate of Conformity is attached

0.00

CH 12/06/11 ①

160 Receive & Inspect for Damage & Mat'l Certs 0.00

\*160\*

Packaging

Packaging

Memo

Ensure certificate of conformity is attached

0.00

★ SEE WID CHG ATTACHED

12/06/11 ①  
12/06/21 ①

170 QC5- Inspect part completeness to step on W/O 0.00

\*170\*

QC

Quality Control

Memo

0.00

Search

NDT issue P/O 17282

CL 12/06/22 ①

see if

attached c/c

# Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	
11.11.01	161	Load TUBE TO 3000 <sup>lb</sup> FOR 1 MINUTE REF D.S. EMAIL		CP 12/6/21		CP 12/6/21		
11.11.01	162	NDT Tube see pg. 4 w				W 12-06-25		

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

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June-07-12 10:34:54 AM

**\*85402\***

Page 5

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Process Plan:

Date:

Tooling:

Date:

Run Start **\*NR1\***

QC:

Date:

SPC (Y/N):

Date:

Stop **\*NR2\***

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

180

0.00

**\*180\***

SprayPaint

SprayPaint

Memo

0.00

Spray Painting

1-Prime inside crosstube as per QSI 005 4.2  
2-Paint Outside of Tube as per Dart QSI 005 4.2

*121746 - 11:15 start  
12:00 Finish  
121625 - Start 4:15  
Finish 5:00*

*As 12-6-22*

190

0.00

**\*190\***

QC

Quality Control

QC14- Inspect Spray Paint

Memo

0.00

Then, Wrap in plastic bag to protect from scratches

*1 12/06/24*

200

0.00

**\*200\***

Crosstubes

Crosstubes

Crosstubes

Memo

0.00

1-Install Ground wire Insert, then insert screw and washer  
2-Install Abrasion strips as per Dwg D350-748-241 & QSI 035.  
3-Install supports Using Dt8876 as per Dwg D350-748-241, Torque to 60-80 IN-  
LBS

*1 12/06/24*

# Work Order ID 85402

June-07-12 10:34:54 AM

**\*85402\***

Page 6

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Start Date: 07/06/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 21/06/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan: Date:

Tooling: Date:

Run Start **\*NR1\***

QC: Date:

SPC (Y/N): Date:

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
210	QC5- Inspect part completeness to step on W/O	0.00							
<b>*210*</b>									
QC	Memo	0.00							
Quality Control									
220	Pick Kit	0.00							
<b>*220*</b>									
Packaging	Memo	0.00							
Packaging									
230	QC4- 100% Inspect kits for completeness	0.00							
<b>*230*</b>									
QC	Memo	0.00							
Quality Control									

0 8 12 06 25

12/0/25

12 06 25

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June-07-12 10:34:54 AM

**\*85402\***

Page 7

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Item Name: Crosstube Installation, High Aft

Start Date: 07/06/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 21/06/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start **\*NR1\***

QC:

Date:

SPC (Y/N):

Date:

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
240		0.00							
<b>*240*</b>	Packaging								
Packaging	Memo	0.00							
Packaging	Identify and pack for shipping as per PPPD350-748-201								
	Location: _____								
	PPP Rev: <u>B</u>								
250	QC21- Final Inspection - Work Order Release	0.00							
<b>*250*</b>									
QC	Memo	0.00							
Quality Control									

1X

80  
12-6-25

MW 12/06/26

MW 12/06/26



# Picklist Print

June-07-12 10:34:58 AM

Page 1

6

Work Order ID: 85402

\*85402\*

Parent Item: D350-748-201

\*D350-748-201\*

Parent Item Name: Crosstube Installation, High Aft

Start Date: 07/06/2012

Required Date: 21/06/2012

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev: A New Issue 06-07-05 JLM  
 IPP Rev: B Update qty of MS21042L5 06-09-12 KJ  
 IPP Rev C Combined manufacturing 08.04.02 EC verified by: DD  
 IPP Rev:D 08-06-24 revD as per dwg DD verified by:EC  
 IPP Rev: E 08.12.11 Step17 was step 21 KJ Verified by:EC IPP Rev:F  
 10.08.04 added QSI010 4.3 DD verf:EC IPP REV:G ADD  
 UNDER BEND COMMENT 12-05-28 JLM

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
---------------------------------	------------------------	---------------	-------------	---------------------	------------------	-----------------	--------------------	----------------	-------------	--------------	---------------	----------------	--------

D350-748-241TRN

Manufactured

No

110

Each

2.0000

1

1

\*D350-748-241TRN\*

Crosstube Turning Detail

\*\*

12-6-7

Location

Loc Qty

Loc Code

LG

83640

2

61314

0

61315

0

79393

1

83287

1

ALS4-1032-225

Purchased

No

200

Each

753.0000

1

1

\*AI S4-1032-225\*

Insert

\*\*

12-08-24

Location

Loc Qty

Loc Code

ST281

730

108696

146

110768

62

118386

55

118966

68

121269

399

ST282

23

120410

10

120451

13

118520

# Picklist Print

June-07-12 10:34:58 AM

Page 2

Work Order ID: 85402

**\*85402\***

Parent Item: D350-748-201

**\*D350-748-201\***

Parent Item Name: Crosstube Installation, High Aft

Start Date: 07/06/2012

Required Date: 21/06/2012

Start Qty: 1.00

Required Qty: 1.00

AN960JD10 NAS1149D0363J Purchased No

200 Each 0.0000 1 1

**\*AN960.ID10\***

\*\*

Washer

121524  
Manufactured No

200 f 207.9745 1.181 1.243158

**\*D2856-400\***

\*\*

Abrasion Strip

## Location

## Loc Qty

## Loc Code

ST403

197.6

81875

197.6

ST409

10.3745

63735

0.6696

68076

0.3149

71164

8.46

79551

0.93

1- cut as per dwg D2856

D3502-1

Manufactured No

200 Each 81.0000 2 2

**\*D3502-1\***

\*\*

Support

## Location

## Loc Qty

## Loc Code

LG050

60

77041

60

ST051

21

73419

11

74873

10

# Picklist Print

June-07-12 10:34:58 AM

Page 3

Work Order ID: 85402

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

\*85402\*

\*D350-748-201\*

Start Date: 07/06/2012

Required Date: 21/06/2012

Start Qty: 1.00

Required Qty: 1.00

MS21920-20

Purchased

No

200

Each

86.0000

2

2

\*MS21920-20\*

Clamp (per MIL-DTL-8783C)

\*\*

12/06/24

121274

## Location

## Loc Qty

## Loc Code

LG050

86

116799

8

120676

8

121067

20

121274

50

MS27039-1-10

Purchased

No

200

Each

126.0000

1

1

\*MS27039-1-10\*

Screw

\*\*

12/06/24

122027

## Location

## Loc Qty

## Loc Code

GA

100

120449

100

ST291

26

120120

26

AN4-41A

Purchased

No

220

Each

539.0000

8

8

\*AN4-41A\*

Bolt

\*\*

12/4/25

## Location

## Loc Qty

## Loc Code

360

181

121185

181

ST360

358

115108

3

115705

7

118451

29

118838

50

119328

100

120423

150

121205

15

121573

4

8

June-07-12 10:34:58 AM

Shop Packet Print

Page 3

# Picklist Print

June-07-12 10:34:58 AM

Page 4

Work Order ID: 85402

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Parent Item Name: Crosstube Installation. High Aft

\*85402\*

\*D350-748-201\*

Start Date: 07/06/2012

Required Date: 21/06/2012

Start Qty: 1.00

Required Qty: 1.00

AN4-6A Purchased No

220 Each 1,513.000 16 16

\*AN4-6A\*

Bolt

\*\*

sf

## Location

## Loc Qty

## Loc Code

355

221

121631

221

ST356

1292

119017

792

121243

500

16

AN5-32A Purchased No

220 Each 245.0000 4 4

\*AN5-32A\*

Bolt

\*\*

sf

## Location

## Loc Qty

## Loc Code

ST339

145

119862

50

120423

75

120910

20

ST340

100

121541

100

4

AN960JD416 NAS1149D0463J Purchased No

220 Each 30.0000 32 32

\*AN960JD416\*

Washer

\*\*

11/2/19/12

sf 12/10/25

## Location

## Loc Qty

## Loc Code

ST351

30

116289

10

119097

20

# Picklist Print

June-07-12 10:34:59 AM

Page 5

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Parent Item Name: Crosstube Installation, High Aft

\*85402\*

\*D350-748-201\*

Start Date: 07/06/2012

Required Date: 21/06/2012

Start Qty: 1.00

Required Qty: 1.00

AN960JD516 NAS1149D0563J Purchased

No

220

Each

16.0000

8

8

\*AN960.ID516\*

Washer

\*\*

M119546

## Location

## Loc Qty

## Loc Code

ST338

16

2612

16

D3500-1

Manufactured

No

220

Each

75.0000

4

4

\*D3500-1\*

Saddle

\*\*

B785958

## Location

## Loc Qty

## Loc Code

ST423

14

78595

14

ST424

31

73405

20

73406

8

76000

3

ST425

30

76940

30

D3501-1

Manufactured

No

220

Each

367.0000

16

16

\*D3501-1\*

Bushing

\*\*

12/6/08

## Location

## Loc Qty

## Loc Code

ST051

367

67757

4

73391

6

74866

207

77033

61

81955

26

83253

63

62

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June-07-12 10:34:59 AM

Page 6

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\*D350-748-201\*

Parent Item Name: Crosstube Installation, High Aft

Start Date: 07/06/2012

Required Date: 21/06/2012

Start Qty: 1.00

Required Qty: 1.00

MS21042L4

Purchased

No

220

Each

3,647.000

24

24

\*MS21042I 4\*

Nut

\*\*

## Location

## Loc Qty

## Loc Code

ST300

3647

119075

116

121011

360

121444

2871

121652

300

24

MS21042L5

Purchased

No

220

Each

1,393.000

4

4

\*MS21042I 5\*

Nut

\*\*

## Location

## Loc Qty

## Loc Code

300

500

121652

500

ST300

893

108827

8

116105

5

116548

43

117611

18

119109

803

17651

8

2937

8

4

NCR: Yes / No

**WORK ORDER NON-CONFORMANCE / UPDATE**

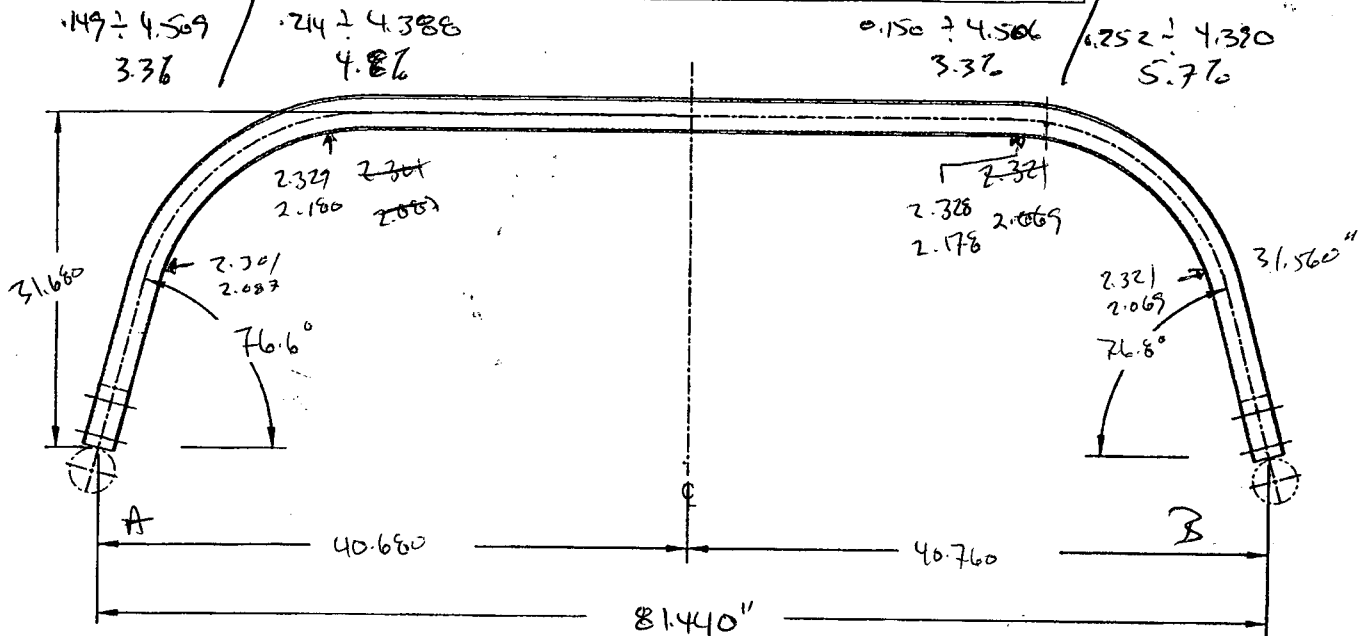
DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

Work Order: _____  Part No. _____  NCR No. _____				<b>DISPOSITION</b>  Rework <input type="checkbox"/> Scrap <input type="checkbox"/> Use-as-is <input type="checkbox"/> Work Order Update <input type="checkbox"/>		<b>AGAINST DEPARTMENT/PROCESS</b>  <table style="width:100%; border: none;"> <tr> <td style="width:25%;">Skid-tube <input type="checkbox"/></td> <td style="width:25%;">Crosstube <input type="checkbox"/></td> <td style="width:25%;">Prod. Eng. Coord. <input type="checkbox"/></td> <td style="width:25%;">Engineering <input type="checkbox"/></td> </tr> <tr> <td>Machining <input type="checkbox"/></td> <td>Small Fab <input type="checkbox"/></td> <td>Rec/Store/Packaging <input type="checkbox"/></td> <td>Quality <input type="checkbox"/></td> </tr> <tr> <td>Thermoforming <input type="checkbox"/></td> <td>Finishing <input type="checkbox"/></td> <td>Supplier <input type="checkbox"/></td> <td></td> </tr> <tr> <td>Large Fab <input type="checkbox"/></td> <td>Composite <input type="checkbox"/></td> <td>Other <input type="checkbox"/></td> <td></td> </tr> </table>						Skid-tube <input type="checkbox"/>	Crosstube <input type="checkbox"/>	Prod. Eng. Coord. <input type="checkbox"/>	Engineering <input type="checkbox"/>	Machining <input type="checkbox"/>	Small Fab <input type="checkbox"/>	Rec/Store/Packaging <input type="checkbox"/>	Quality <input type="checkbox"/>	Thermoforming <input type="checkbox"/>	Finishing <input type="checkbox"/>	Supplier <input type="checkbox"/>		Large Fab <input type="checkbox"/>	Composite <input type="checkbox"/>	Other <input type="checkbox"/>	
Skid-tube <input type="checkbox"/>	Crosstube <input type="checkbox"/>	Prod. Eng. Coord. <input type="checkbox"/>	Engineering <input type="checkbox"/>																								
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Thermoforming <input type="checkbox"/>	Finishing <input type="checkbox"/>	Supplier <input type="checkbox"/>																									
Large Fab <input type="checkbox"/>	Composite <input type="checkbox"/>	Other <input type="checkbox"/>																									
Root Cause	Date	Step	Qty	Description of work order update or Non-conformance	Initial Chief Eng	Action Description	Sign & Date	Verification	QC Inspector																		
Doc/Data <input type="checkbox"/>																											
Equip/Tooling <input type="checkbox"/>																											
Operator <input type="checkbox"/>																											
Material <input type="checkbox"/>																											
Offset/Setup <input type="checkbox"/>																											
Other <input type="checkbox"/>																											
Process <input type="checkbox"/>																											
Supplier <input type="checkbox"/>																											
Training <input type="checkbox"/>																											
Unauthorized <input type="checkbox"/>																											
<b>FAULT CATEGORY</b>																											
<b>Landing Gear</b> <input type="checkbox"/> Bending Passes Below Min <input type="checkbox"/> Centre Not Concentric to O/S <input type="checkbox"/> Cracks <input type="checkbox"/> Crushed/Crimp at Bending <input type="checkbox"/> Inspection Strip in Tube <input type="checkbox"/> Other <input type="checkbox"/> Positioned Wrong <input type="checkbox"/> Ripples on Inner Bend <input type="checkbox"/> Torque Waves in Extrusion <input type="checkbox"/> Turning Sequence <input type="checkbox"/> Wave/Twist in Tube			<b>Hardware</b> <input type="checkbox"/> Breaking <input type="checkbox"/> Missing <input type="checkbox"/> Size/Length <input type="checkbox"/> Spinning <input type="checkbox"/> Threading <input type="checkbox"/> Wrong  <b>Drill Holes</b> <input type="checkbox"/> Misaligned <input type="checkbox"/> Ovalized <input type="checkbox"/> Over/Undersized <input type="checkbox"/> Too Many			<b>General</b> <input type="checkbox"/> Burrs <input type="checkbox"/> Contamination <input type="checkbox"/> Cut Too Short <input type="checkbox"/> Documentation/Data <input type="checkbox"/> Finish <input type="checkbox"/> Inspection Incomplete <input type="checkbox"/> Inspection Unqualified <input type="checkbox"/> Instructions Incomplete/Unclear <input type="checkbox"/> Jigs/Fixtures/Tooling <input type="checkbox"/> Kit Incorrect <input type="checkbox"/> Kit Missing			<input type="checkbox"/> Maintenance <input type="checkbox"/> Mislabeled <input type="checkbox"/> Off-Set <input type="checkbox"/> Orientation Misread <input type="checkbox"/> Out of Calibration <input type="checkbox"/> Out of Sequence <input type="checkbox"/> Outside Dimensions <input type="checkbox"/> Over/Under tolerance <input type="checkbox"/> Part Lost <input type="checkbox"/> Part Moved <input type="checkbox"/> Raw Material		<input type="checkbox"/> Set-up <input type="checkbox"/> Supplier <input type="checkbox"/> Temperature/Cure <input type="checkbox"/> Weld <input type="checkbox"/> Wrong Stock Pulled  <input type="checkbox"/> Other _____ _____ _____																

DART AEROSPACE LTD		Work Order:	25402
Description: Crosstube High Aft (AS350/355)		Part Number:	D350-748-201
Inspection Dwg: D350-748-241	Rev: E	Page 1 of 1	

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06



Acceptable  
P12/6/8

Comments
twist = 0.378
Side A = 4.8% near cuff + 3.3% crush at End of top of Bend
Side B = 5.7% near cuff + 3.3% crush at End of top of Bend

QC15 Inspection	S
Date	12/6/08

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

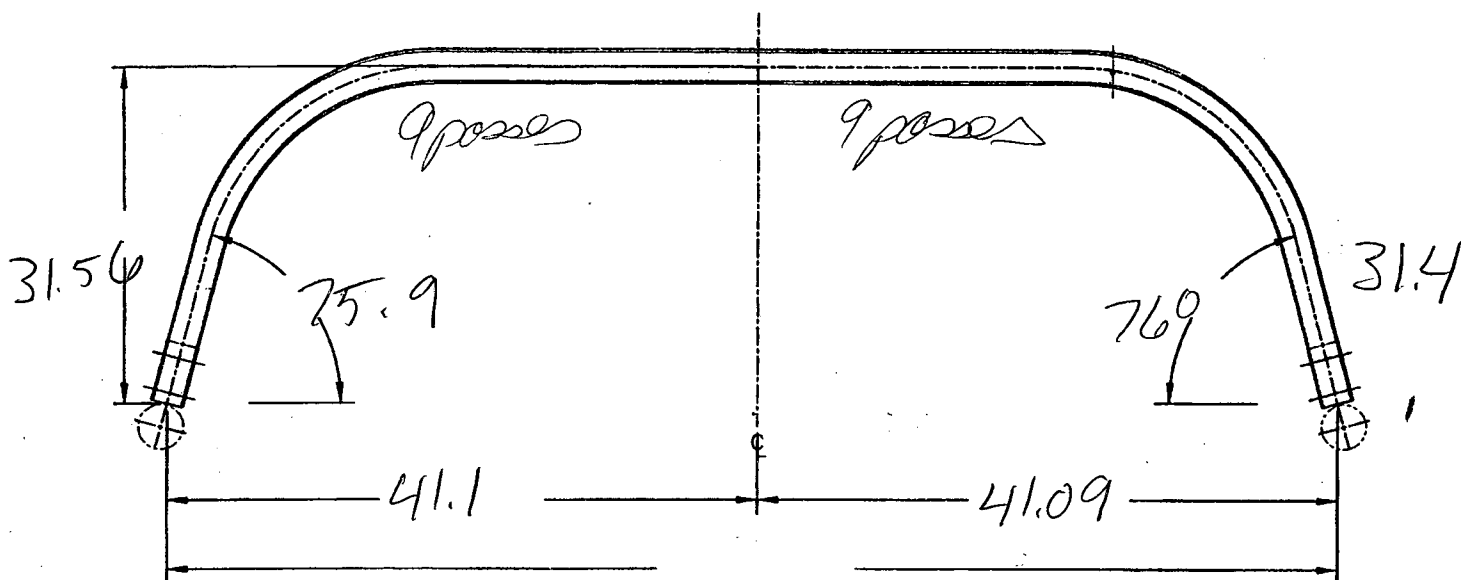


*Bepel De-Stress*

DART AEROSPACE LTD		Work Order:	85402
Description: Crosstube High Aft (AS350/355)		Part Number:	D350-748-201
Inspection Dwg: D350-748-241	Rev: E	Page 1 of 1	

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06

REFERENCE ONLY



Comments

*[Signature]*  
12-6-7

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	<i>[Signature]</i>

<b>DART AEROSPACE LTD</b>		<b>Work Order:</b> B83640
<b>Description:</b> Crosstube Assembly (AS350/355 High Aft)		<b>Part Number:</b> D350-748-241
<b>Inspection Dwg:</b> D350-748-241 <b>Rev:</b> F		Page 1 of 1

### FIRST ARTICLE INSPECTION CHECKLIST

Inspection Sheet	Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.235	✓	✓	VERN	CNC-08
	2.180	+0.005/-0.000	2.181	✓			
	2.180	+0.005/-0.000	2.180	✓			
	2.208	+0.005/-0.000	2.204	✓	✓		
	2.234	+0.005/-0.000	2.235	✓			
	2.253	+0.005/-0.000	2.256	✓			
	2.272	+0.005/-0.000	2.279	✓			
	2.299	+0.005/-0.000	2.301	✓			
	0.063	+/-0.010	0.063	✓		RL	
	4.26	+/-0.030	4.26	✓			
	R0.063	+/-0.010	0.063	✓		RL	
	R0.50	+/-0.030	50	✓		RL	
SIDE B	2.240	+0.005/-0.000	2.239	✓	✓	VERN	CNC-08
	2.180	+0.005/-0.000	2.182	✓			
	2.180	+0.005/-0.000	2.181	✓			
	2.208	+0.005/-0.000	2.212	✓			
	2.234	+0.005/-0.000	2.239	✓			
	2.253	+0.005/-0.000	2.252	✓			
	2.272	+0.005/-0.000	2.276	✓			
	2.299	+0.005/-0.000	2.304	✓			
	0.063	+/-0.010	0.063	✓		RL	
	4.26	+/-0.030	4.26	✓			
	R0.063	+/-0.010	0.063	✓		RL	
	R0.50	+/-0.030	50	✓		RL	
	122.70	+/-0.060	122.75	✓		TAPC	MM-02

<b>Measured by:</b> KK	<b>Audited by:</b>	<b>Preliminary Approval:</b>
<b>Date:</b> 12-6-06	<b>Date:</b>	<b>Date:</b>

Rev	Date	Change	Revised by	Approved
A	07.01.17	New Issue (P/O D350-748-201)	KJ/JLM	
B	12.02.02	Dwg Rev updated	KJ	

Item	Qty	Part Number	Description
	-241		
1	X	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HI AF T)
2	1	D6015-125	CROSSTUBE (OR D6018-125)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

# GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6018-125  
FINISHED LENGTH = 122.700±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2  
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER "D350-748-241" AND BATCH NUMBER ON INSIDE OF CUFF  
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 29.85 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT ALL EDGES FROM MACHINING  
LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER  
BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO  
BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO  
VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE,  
CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE  
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES,  
NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY.  
CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE  
MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO  
CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT  
NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN  
CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT

WITHOUT NOTICE  
WORK ORDER  
NO. 85402 MLJ  
12/06/07

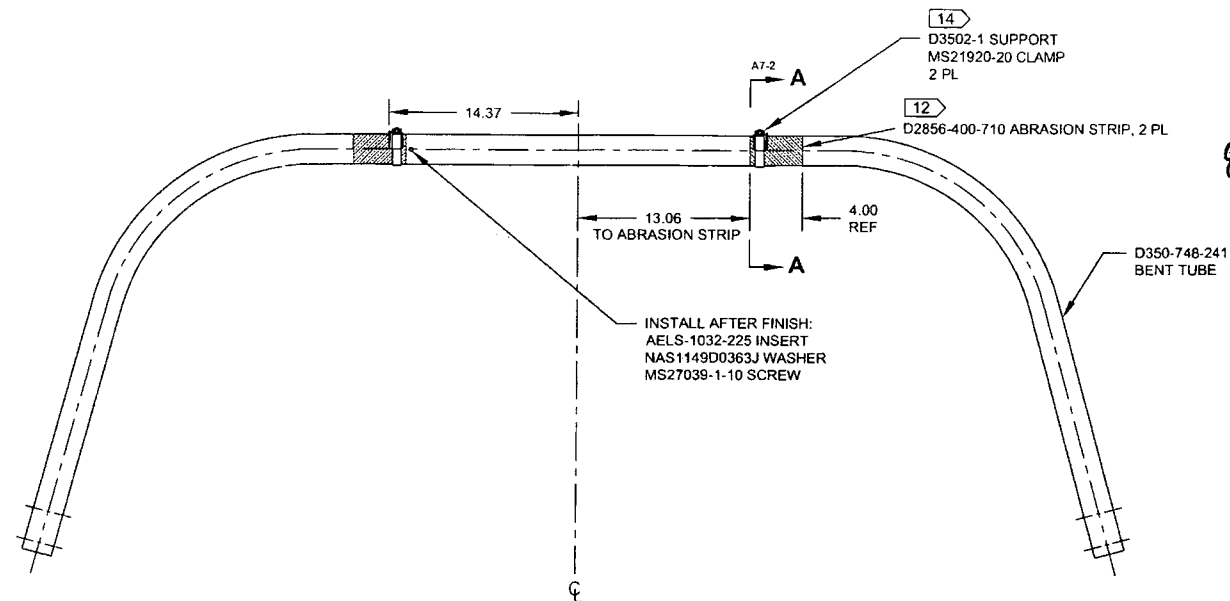
RELEASED  
2011-07-08

F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES; UPDATE TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A8-3); ADD TOLERANCES (ZN C6-3, D2-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6018-125 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED			
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	10.11.23		

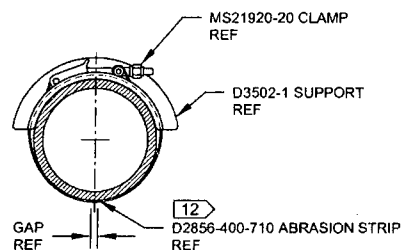
**DART AEROSPACE LTD**  
HAWKESBURY, ONTARIO, CANADA

DRAWING NO. REV. F  
D350-748-241 SHEET 1 OF 4  
TITLE SCALE  
CROSSTUBE (AS 350/355 HI AF T) NTS

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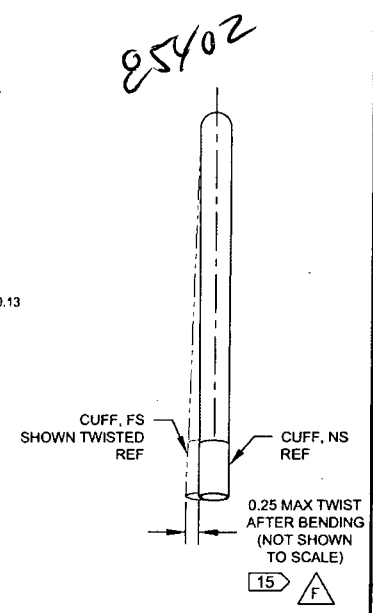
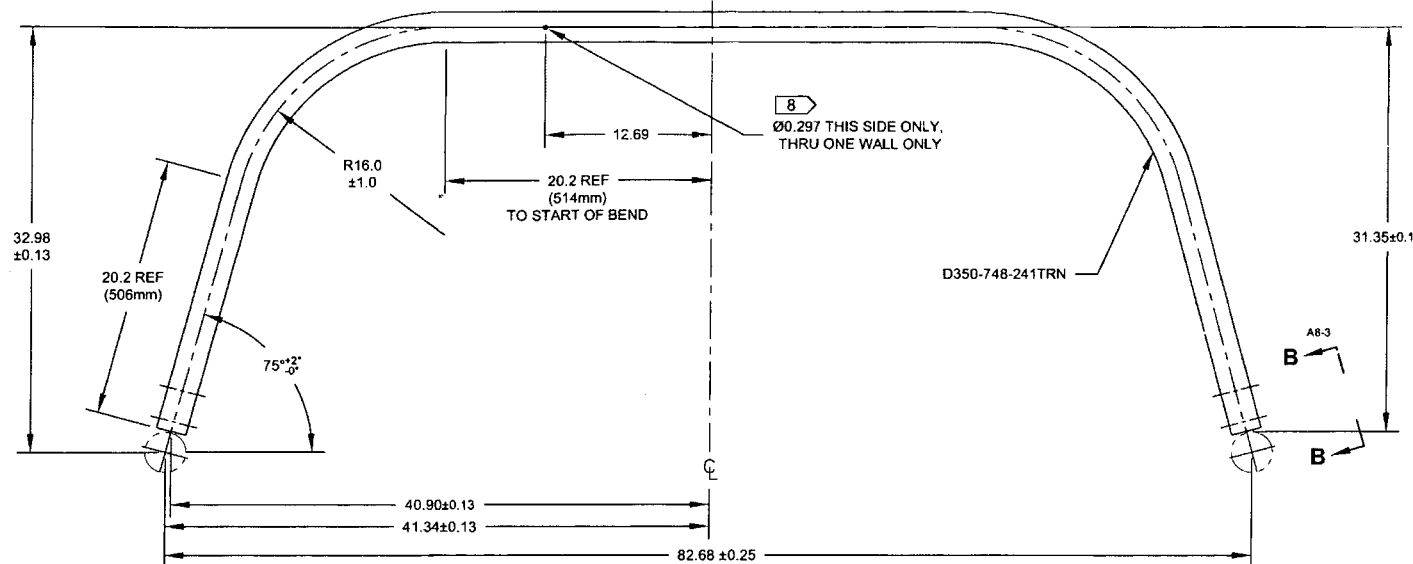
**D350-748-241  
ASSEMBLY DETAIL**



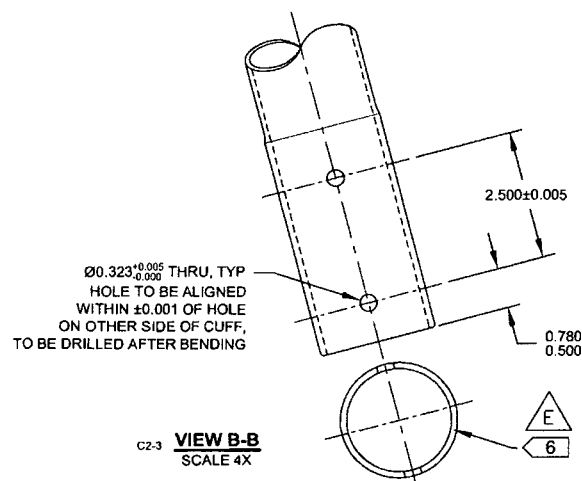
**SECTION A-A** D4-2  
SCALE 4X

**RELEASED**  
2011-05-19

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DRAWN	9P	HAWKESBURY, ONTARIO, CANADA	
CHECKED	13	DRAWING NO.	REV. F
MFG. APPR.	13	D350-748-241	SHEET 2 OF 4
APPROVED	14	TITLE	SCALE
DE APPR.	14	CROSSTUBE (AS 350/355 HI AFT)	NTS
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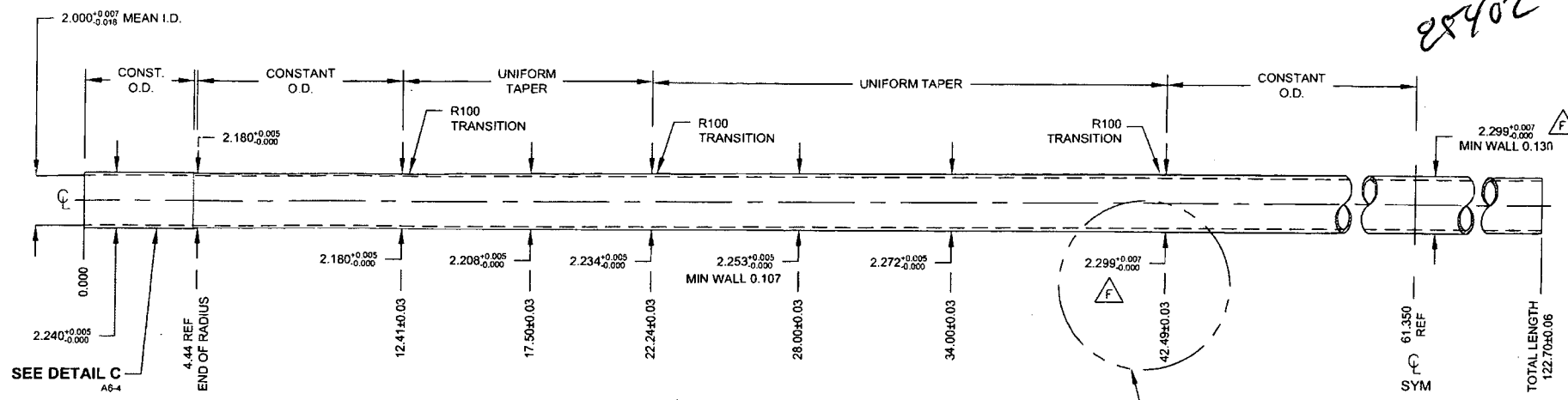
**D350-748-241**  
**BENDING AND DRILLING DETAIL** 10



**RELEASED**  
2011-01-18

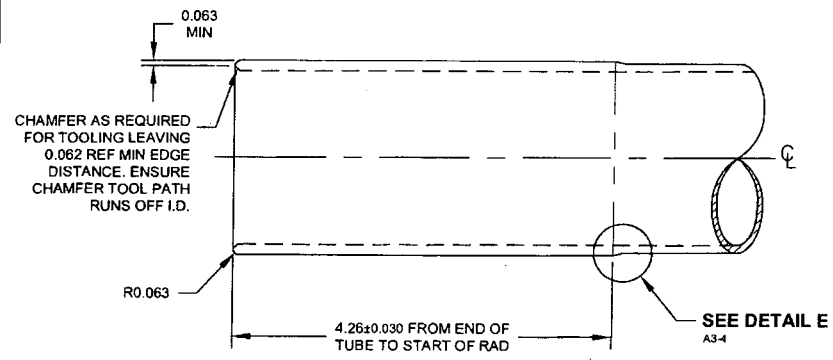
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CHECKED	92	DRAWING NO.	REV. F
MFG. APPR.	92	D350-748-241	SHEET 3 OF 4
APPROVED	92	TITLE	SCALE
DE APPR.	92	CROSSTUBE (AS 350/355 HI AFT)	NTS
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25402

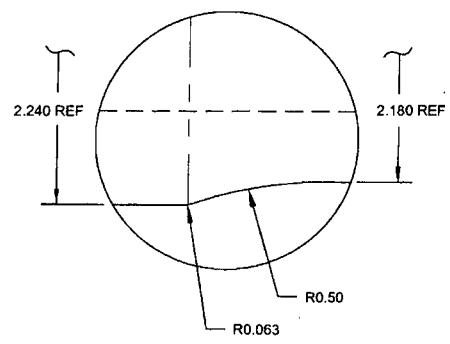


**D350-748-241TRN  
TURNING DETAIL**

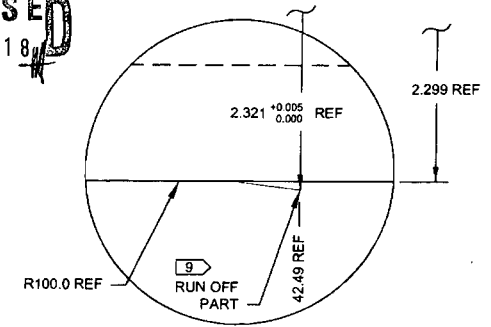
RELEASED  
2011-01-18



**DETAIL C:  
CROSSTUBE CUFF** C6-4  
SCALE 3X



**DETAIL E:  
CUFF TRANSITION** A5-4  
NOT TO SCALE



**DETAIL D:  
TAPER RUN-OFF** C3-4  
NOT TO SCALE

DESIGN	GP	<b>DART AEROSPACE LTD</b>	
DRAWN	GP	HAWKESBURY, ONTARIO, CANADA	
CHECKED	JS	DRAWING NO.	REV. F
MFG. APPR.	BE	D350-748-241	SHEET 4 OF 4
APPROVED	TH	TITLE	SCALE
DE APPR.	TH	CROSSTUBE (AS 350/355 HI AFT)	NTS
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# METCOR INC.

560 BOUL. ARTHUR-SAUVÉ  
ST-EUSTACHE, QC J7R 5A8  
Tel: 450-473-1884 / Fax: 450-491-5498

## Recu de Livraison

Order	Shipper	Shipping Seq.
176670	1	61651

Shipped Complete

Customer **215**

**DART AEROSPACE**  
1270 ABERDEEN  
HAWKESBURY, ON K6A 1K7  
Ph: 613-632-5200  
Fax: 613-632-1053

Shipped To:

**DART AEROSPACE**  
1270 ABERDEEN  
HAWKESBURY, ON K6A 1K7  
Ph: 613-632-5200  
Fax: 613-632-1053

Purchase Order Number	Customer Shipper No.	Material Type	Order Date	Carrier
PO17159		Steel	2012/6/7	PICK UP
Quantity	Part No. / Part Name / Part Description			Pounds
5	D350-748-201 CONTENANT: 1 PALETTE			150,

Container Type	# Of Containers	Container Comments
PALETTE	1	

CERTIFICAT

<b>PACKING</b>	
----------------	--

Quantity Shipped: 5

Pounds Shipped: 150,00

Quantity Remaining: 0

Pounds Remaining: 0,00

CERTIFICAT

Quantity Shipped: 5

Pounds Shipped: 150,00

Signature:

Date:

# METCOR INC.

560 BOUL. ARTHUR-SAUVÉ  
ST-EUSTACHE, QC, J7R 5A8

Tel: 450-473-1884 / Fax: 450-491-5498

## Certificat de Conformité Détaillé

Detailed Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
176670	1

CLIENT / customer 215

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K6A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE

1270 ABERDEEN

HAWKESBURY

ON K6A 1K7

1

COMMANDE DU CLIENT customer po	BON DE LIVRAISON DU CLIENT customer shipper no.	MATÉRIEL material	CODE DE TRAITEMENT mat'l heat code	NUMÉRO DE LOT lot number
PO17159		Steel		

### SPÉCIFICATIONS DU PROCÉDÉ processing specifications

STRESS REL

SAE AMS 2759/1 REV.E

EXIGENCE / requirement SPÉCIFICATIONS / specified TESTS EXÉCUTÉS / performed RÉSULTATS DE TESTS / results

Visual

QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description
5	150	D350-748-201 (1) CROSSTUBE REFERENCE: 73806  (1) D350-748-201 CROSSTUBE REFERENCE: 73808  (1) D350-748-201 CROSSTUBE REFERENCE: 73809  (1) D350-748-201 CROSSTUBE REFERENCE: 85335  (1) D350-748-201 CROSSTUBE REFERENCE: 85402  CONTENANT: 1 PALETTE

Operation	Temp. spécifiée Specified Temp	Temps de trempage Spécifié Specified Soak Temp	Atmosphère	Carbone Carbon Potential	Q-Media Q-Temp	Four # Furnace #	Date Départ Start Date	Heure d'entrée Time In	Heure de sortie Time Out	Date Complétée Date complete
1.00 CONT. INIT.	LAVAGE		si nécessaire							



# METCOR INC.

560 BOUL. ARTHUR-SAUVÉ  
ST-EUSTACHE, QC, J7R 5A8

Tel: 450-473-1884 / Fax: 450-491-5498

## Certificat de Conformité Détaillé

Detailed Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
176670	1

CLIENT / customer 215

DART AEROSPACE  
1270 ABERDEEN  
HAWKESBURY

ON K6A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE  
1270 ABERDEEN  
HAWKESBURY

ON K6A 1K7

1

Operation	Temp. spécifiée Specified Temp	Temps de trempé Spécifié Specified Soak Temp	Atmosphere	Carbone Carbon Potential	Q-Media Q-Temp	Four # Furnace #	Date Départ Start Date	Heure d'entrée Time In	Heure de sortie Time Out	Date Complétée Date complete
2.00 PREPARING	COMPTAGE									
3.00 STRESS RE	345 +/-25°C	2:30 hrs	air			701				
4.00 FINAL INSP							06-08-2012			06-08-2012

### COMMENTAIRES / comments

ALL THE HEAT TREATMENT PROCESSING PERFORMED ON THIS ORDER WAS ACCOMPLISHED USING HEAT TREATMENT EQUIPEMENT THAT MEETS THE REQUIREMENTS OF AMS 2759. ALL THE HEAT TREATMENT OPERATIONS WERE ACCOMPLISHED IN ACCORDANCE WITH THE REQUESTED/REQUIRED HEAT TREATMENT SPECIFICATION AND ALL REQUIRED VERIFICATIONS TEST HAVE BEEN PERFORMED AND DOCUMENTED. NO UNAUTHORIZED CHANGES OR DEVIATIONS TO REQUIRED HEAT TREATMENT SPECIFICATIONS OR PROCEDURES HAVE BEEN PERFORMED.

APPROUVÉ par / Approved by:

*[Signature]*



DATE: 2012-06-08

/ Nous certifions que toute l'information comprise sur ce rapport est exacte et conforme aux requis du client. / We certify that all the information on this report is exact and in accordance with the order requirements.

**CERTIFICATE OF  
CONFORMANCE**

**CADORATH PLATING CO. LTD.  
2150 LOGAN AVENUE  
WINNIPEG, MANITOBA R2J-0J1**

**DATE:** Jun-20-2012

**CONSIGNED TO:** Dart Aerospace Ltd.  
1270 Aberdeen St.  
Hawksbury, ON K6A 1K7

**W/O #:** 115265

**INVOICE #:** 60974

**CONTRACT OR  
PURCHASE ORDER #** PO17184

**DESCRIPTION:** CROSSTUBE **QTY** 1

**P/N #** D350-748-201

**S/N #** 85402

STRESS RELIEF BAKE HEAT CHART # 12-589. MPI IAW ASTM-E-1444. CADMIUM PLATE IAW AMS-QQ-P-416C TYPE 2 YELLOW CLASS 2. BAKE HEAT CHART #12-604. MPI IAW ASTM-E-1444.

**CERTIFICATE:** I certify that the items indicated here on have been inspected and tested and conform to all specifications and requirements detailed on the contract or purchase order.

**Approved Inspector:**





## LIQUID PENETRANT TEST REPORT

P- 12189

CLIENT DART AERO SPACE DATE JUNE 27/2012 PAGE 1 OF 1  
ATTENTION LINDA / MATT ACUREN JOB NO. 188-12-C0270 TIME AM ☒ PM ☐  
ADDRESS 1270 A BENDEN ST. POWO No. -  
HAWKESBURY, ON. WORK LOCATION SAME  
ACCEPTANCE STD. ASTM 1417/PSI-030 REV./DATE 2005  
PROJECT F.P.I. ON CROSS TUBES  
ITEM(S) EXAMINED 2 PCS

JOB DESCRIPTION PROCEDURE No. LT 0002 REV./DATE 2008 TECHNIQUE No. LT 1417 REV./DATE 2008  
PART NO. SEE RESULTS MATERIAL STEEL / ALUMINUM THICKNESS VARIOUS  
SCOPE A DYE FLOUORESCENT PENETRANT INSPECTION WAS CARRIED OUT ON THE EXTERNAL SURFACE 100%

TEST DETAILS  
METHOD ☒ FLUORESCENT ☐ VISIBLE ☒ WATER WASH ☐ SOLVENT REMOVABLE ☐ POST EMULSIFIED  
FAMILY BRAND MAGNA FLUX BLACK LIGHT S/N 16059 ☐ OUTPUT > 1000  $\mu$ W/cm<sup>2</sup> ☐ AMBIENT < 2 fc  
PENETRANT ZLG7 MINIMUM DWELL TIME 10 MIN. LIGHTING EQUIP. ☐ FLASHLIGHT ☐ TROUBLELIGHT ☐ OUTPUT > 100 fc @ SURFACE  
PENETRANT REMOVER H2O MINIMUM DRY TIME > 10 MIN. OTHER LABINO  
DEVELOPER SK052 MINIMUM DWELL TIME 10 MIN. LIGHT METER S/N 1098866 CAL DUE DATE JULY 28/2012  
DEVELOPER TYPE ☒ NON AQUEOUS ☐ AQUEOUS ☐ DRY

TEST SURFACE  
SURFACE CONDITION ☐ AS GROUND ☐ AS WELDED ☒ MACHINED ☐ SHOT BLASTED ☒ CLEAN BARE METAL  
SURFACE TEMPERATURE ☐ < -4°C/ 20°F ☐ -4°C/ 20°F TO 10°C/50°F ☒ 10°C/50°F TO 52°C/125°F ☐ > 52°C/125°F

RESULTS- ☒ METRIC ☐ IMPERIAL

W.O. #	CROSS TUBES	ACCEPT
1 - 85335	" "	✓
1 - 73809	" "	✓
1 - 85402	" "	✓
1 - 73808	" "	✓
1 - 73806	" "	✓
1 - 84184	" "	✓
1 - 84185	" "	✓
1 - 84527	" "	✓
1 - 84526	" "	✓

STEEL TUBES  
ALUMINUM TUBES

Scope of Services  
The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care  
In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

SIGNATURES  
CLIENT REPRESENTATIVE Andy Sheldon PRINT ASheldon SIGNATURE  
TECHNICIAN (SIGNATURE): Mike Harshe 1<sup>st</sup> TECHNICIAN  
NAME (PRINT): Mike Harshe 2<sup>nd</sup> TECHNICIAN  
CGSB LEVEL 2 SNT LEVEL 6006 CGSB REG. No. 6006  
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